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Amended

Drosophila; and

- (b) stimulating signal transduction of a bone morphogenetic protein (BMP) signaling pathway in at least one germline stem cell of said population by providing expression of a nucleic acid encoding Decapentaplegic (Dpp) protein;

wherein said stimulation increases the abundance of germline stem cells in said population as compared to a population in which signal transduction of said BMP signaling pathway has not been stimulated.

- b2
2. (Twice Amended) A method according to Claim 1, wherein said Drosophila containing the germline stem cells has been genetically engineered to stimulate signal transduction.

- b3
7. (Amended) A method according to Claim 1, wherein at least 10% more Decapentaplegic (Dpp) protein is provided to said population than is present in wildtype Drosophila.

- b4
12. (Amended) A method according to Claim 1, wherein said BMP signaling pathway is stimulated through at least one serine/threonine kinase receptor that specifically recognizes said Dpp.

13. (Amended) A method according to Claim 12, wherein said Dpp receptor is selected from the group consisting of Saxophone (Sax), Thick veins (Thv), and Punt (Put).
16. (Amended) A method according to Claim 1, wherein said BMP signaling pathway is stimulated by increasing expression of Dpp in a cell of said population.
17. (Amended) A method according to Claim 16, wherein Dpp expression is increased by *hedgehog* (*hh*)-activated transcription or *wingless* (*wg*)-activated transcription, and Dpp signaling is increased in at least some of the germline stem cells.
25. (Amended) A method according to Claim 1 further comprising transferring at least one of said stimulated germ line stem cells into a second host *Drosophila*.
26. (Amended) A method according to Claim 25, wherein at least one of said transferred germline stem cells is capable of contributing to two or more differentiated cell lineages of said second host *Drosophila*.
27. (Amended) A method according to Claim 25, wherein at least one of said

3a  
3b  
3c

transferred germline stem cells contributes to a germline cell lineage of said second *Drosophila*.

3d

33. (Amended) A method for maintaining *Drosophila* stem cells *in vivo* comprising:
- (a) providing a population comprised of said stem cells, and
  - (b) stimulating a *decapentaplegic (dpp)* signaling pathway in at least one stem cell in said population by providing expression of a nucleic acid encoding Dpp,
- such that there is an increase in abundance of undifferentiated stem cells in said population as compared to a population of stem cells which has not been stimulated.

3e

35. (Amended) A method of increasing abundance of stem cells of an organism *in vivo* comprising:
- stimulating signal transduction by a bone morphogenetic protein (BMP) receptor pathway by providing expression of a nucleic acid encoding Dpp such that abundance of at least some stem cells is increased as compared to an organism in which BMP signal transduction is not stimulated.
36. (Amended) A method of increasing lifetime of stem cells of an organism *in vivo* comprising:

stimulating signal transduction by a bone morphogenetic protein (BMP) receptor pathway by providing expression of a nucleic acid encoding Dpp such that said lifetime of at least some stem cells is increased, wherein said increased lifetime of at least some stem cells leads to an increased abundance of stem cells in said organism as compared to an organism in which BMP signal transduction is not stimulated.

Kindly enter and consider the following new claims:

- 89
- 37. (New) A method according to Claim 1, wherein there are at least ten germline stem cells in said population for each stem cell present prior to stimulation of BMP signaling.
38. (New) A method according to Claim 1, wherein said host *Drosophila* contains at least a hundred germline stem cells following stimulation of said BMP signaling pathway.
39. (New) A method according to Claim 1, wherein said host *Drosophila* contains at least five hundred germline stem cells following stimulation of said BMP signaling pathway.
40. (New) A method according to Claim 1, wherein said Dpp is ectopically expressed

in germarium of said host *Drosophila* using hsp70-GAL4 and UAS-*dpp*.

41. (New) A method according to Claim 1, further comprising isolating said increased abundance of germline stem cells and culturing said germline stem cells *in vitro*.
42. A method according to claim 1, wherein said signal transduction is further stimulated by altering activity of at least one signal transducer for receptor binding to Dpp.
43. The method according to claim 42, wherein said signal transducer is selected from the group consisting of Mothers against *dpp* (Mad), Medea (Med), Daughters against *dpp* (Dad), Schnurri (Shn), and Brinker (Brk).--